Microbiology 2010 vol.79 N2, pages 178-183

Aerobic degradation of 2,4,6-trinitrotoluene by the yeast strain Geotrichum candidum AN-Z4

Ziganshin A., Gerlach R., Naumenko E., Naumova R.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The yeast strain Geotrichum candidum AN-Z4 isolated from an anthropogenically polluted site was able to transform 2,4,6-trinitrotoluene (TNT) via the formation of unstable intermediate hydride Meisenheimer complexes with their subsequent destruction and accumulation of nitrite and nitrate ions as the end mineral forms of nitrogen. Aeration of the medium promoted more profound destruction of this xenobiotic by the strain G. candidum AN-Z4 than static conditions. The yeast strain was shown to produce citrate, succinate, and isocitrate, which sharply acidified the medium and influenced the TNT destruction. Two possible pathways of TNT biodegradation were confirmed experimentally: (1) via the destruction of the TNT-monohydride complex (3----TNT) and (2) via the destruction of one protonated TNT-dihydride complex (3,5-2H--TNT · H+). The strain G. candidum AN-Z4, due to its ability for TNT degradation, may be promising for bioremediation of TNT-contaminated soil and water. © Pleiades Publishing, Ltd., 2010.

http://dx.doi.org/10.1134/S0026261710020086

Keywords

2,4,6-trinitrotoluene, Geotrichum candidum, Hydride Meisenheimer complexes, Nitrate ion, Nitrite ion